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Marine exploration hazards factsheet

Deliverable D2.2

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Introduction

The SOMOS project aims to develop and communicate Technical Standards for Safe Production of Food and Feed from Marine Plants and Safe Use of Ocean Space. It is funded by Lloyd's Register Foundation and carried out by Wageningen University Research and TNO. This factsheet is the deliverable of Work package 2: Safety of People and property in multi-use maritime locations: Deliverable D2.2 A marine exploration hazards factsheet for the first workshop

Title	Safety of people and Property multi use maritime locations
Multi-use examples	Activities in offshore wind farms, such as fishery, fish farming, seaweed farming; Marine services at off shore fish farms.
Issue	How to assess safety implications of multiple exploitation activities at a fixed location at sea?
Approach	Select an appealing example of multiple exploitation activities at sea Apply existing safety assessment methods and techniques on this example Modify methods and techniques where necessary Generalise the modified methods and techniques
	Potential candidate for ***safety assessment methods***: *Guidelines for Formal Safety Assessment (FSA)* IMO INTERNATIONAL MARITIME ORGANIZATION **FSA Methodology** Out of Scope Step 1 Hazard Identification Step 2 Risk Assessment Step 5 Decision-Making Recommendations Step 3 Risk Control Options Step 4 Cost-Benefit Assessment
Case	The best opportunities for multi-use of ocean space can be found in activities that combine logically from an ecological and/or economical point of view, e.g. the combination of Energy Production and Aquaculture. To show that Technical Standards for Safe Production of Food and Feed from Marine Plants and Safe Use of Ocean Space can be developed and communicated, the following case is chosen: a seaweed farm in an off-shore wind park. The test farm of the North Sea Farm foundation in Scheveningen will be used as reference for the sea weed farm and Wind park Egmond aan Zee for the off-shore wind park. A full-scale sea weed farm in the Netherlands does not exist (yet). Potential sizes are: Farm: 100 hectares. Length of underline: 500 meters. Total length including the chains to the foundation: 800-1000 meters. Distance between the modules: 250 meters (after gaining more experience this distance may be reduced). Hence a farm will consist of five modules placed perpendicular to the current.

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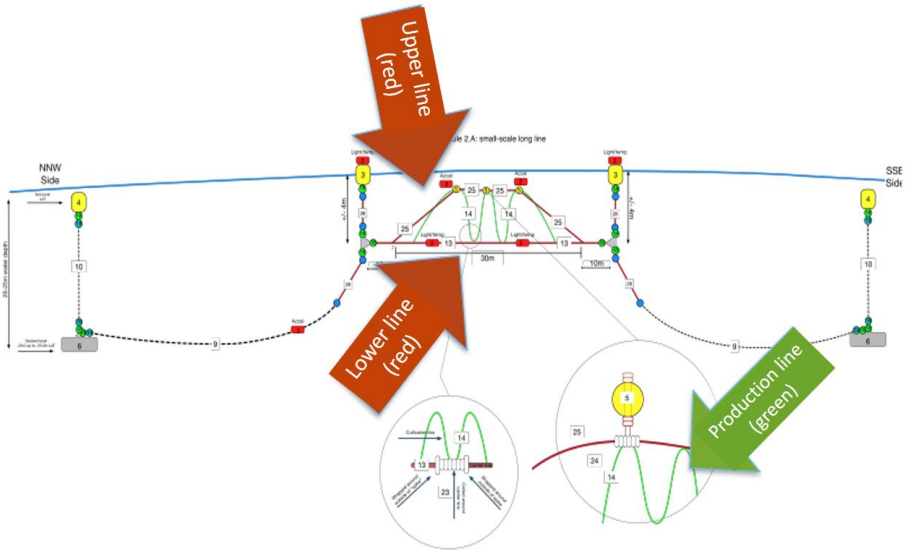

To avoid wind turbines influencing each other's production, on average they are placed about six rotor diameters apart. At rotor diameter of 90 meters that is about 600 meters.

Hazard Identification

The next table presents the additional hazards, i.e. the undesired events that may occur due to the combination of the Wind Park and Sea Weed Farm, as identified by TNO and discussed at the SOMOS workshop in June 2017.

No.	Hazard / undesired event
1	Substrate system out of position
2	Contaminants in the water
3	Sea weed vessel collides with wind turbine
4	Ship-ship collision
5	Ship hits diver
6	Windfarm vessel hits substrate system
7	Sea weed vessel hits electric power lines
	Security or illegal activities are excluded, since not due to the combination of activities

Follow-up

We will establish tools and methods to analyse and assess the hazards of multi-use at sea. A formal safety assessment commonly consists of the following steps:

1. Identification of hazards;
2. Risk analysis;
3. Risk control options;
4. Techniques that can aid decision-making (e.g. cost benefit or multi criteria analysis);
5. Recommendations for decision-making.

The hazards in the table above have been used to define causes and consequences which have been discussed during the workshop in June 2017 (step 1). The now identified hazards will be input for the event and fault trees. Professionals in the field will be asked to reflect on those trees (step 1 and 2). We will show how one could quantify risks (qualitatively and/or quantitatively).

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